

HWY-11-MH-012  
Truck Trailer - Amtrak Train Collision  
Miriam, NV  
June 24, 2011

## ATTACHMENT 37

Signal Factual



# **NATIONAL TRANSPORTATION SAFETY BOARD**

**OFFICE OF RAILROAD, PIPELINE &**

**HAZARDOUS MATERIAL INVESTIGATIONS**

**WASHINGTON, D. C. 20594**

**HWY11MH012**

**TRACTOR-TRAILER HIGHWAY/RAIL GRADE CROSSING COLLISION STRIKING  
AMTRAK PASSENGER TRAIN**

**On Union Pacific Nevada Subdivision**

**Miriam, Nevada**

**June 24, 2011**

**SIGNAL GROUP FACTUAL REPORT**

**Prepared by: Timothy J. DePaepe, Signal Group Chairman**

**Accident:**

NTSB Accident Number:	HWY11MH012
Date of Accident:	June 24, 2011
Time of Accident:	11:19 a.m.
Type of Train:	Amtrak Passenger Train
Railroad Owner:	Union Pacific (UP)
Train Operator:	Amtrak
Fatalities:	5
Location of Accident:	Miriam, Nevada

**Signal Group:**

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**Synopsis:**

About 11:19 a.m., on Friday, June 24, 2011 a tractor semi-trailer combination travelling northbound on State Highway 95 struck the side of westbound Amtrak train No. 5 in an at-grade crossing near Miriam, Nevada. The force of the collision imbedded the truck cab inside the first passenger car. The first passenger car was located behind the two Amtrak locomotive units and the baggage car. The engineer had applied emergency braking prior to the collision and the train stopped approximately 2600 feet beyond the point of collision. A fire broke out in the wreckage. The driver of the truck, the train conductor and four passengers were fatality injured. The collision also severely damaged the signal bungalow at the grade crossing. The crossing was equipped with train activated gates, lights and bells. There were no atmospheric restrictions to visibility.



**Figure 1. Damaged Grade Crossing Signal System Bungalow.**

### **Description of Railroad Signal System and the Grade Crossing Signal System:**

The UP Nevada Subdivision runs in a timetable east/west direction. The UP track structure in the vicinity of the accident consists of single main track territory. The maximum timetable speed on the Nevada Subdivision is 70MPH for freight trains and 79 MPH for passenger trains

Train movements on the Nevada Subdivision are governed by operating rules, General Orders, timetable instructions, and a Train Control System (TCS).

The grade crossing signal system consisted of 2 Western Cullen Hayes 3593-E gates with fiberglass gate arms. Each gate arm has three lights. When the grade crossing signal system is activated, the first two lights flash alternatively and the third light, or tip light is constantly lit. Each roadway gate is mounted on a mast, and each mast has a bell. There are also two cantilever signal masts with four 12-inch LED flashers on each mast and four 12-inch LED flashers mounted above the highway street. There are a total of 16 12-inch flashers at the crossing.

The train detection system consisted of a Safetran Microprocessor Based Grade Crossing Predictor GCP-3000<sup>1</sup> with a Highway Crossing Analyzer (HCA)<sup>2</sup> unit. The Safetran GCP-3000 termination shunts are located 4636 feet in each direction from the grade crossing. The Safetran (GCP-3000) monitors railroad traffic and controls the activation of the warning devices. The GCP-

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<sup>1</sup> The 3000 Grade Crossing Predictor (GCP) is a microprocessor-controlled system that is deployed to continually monitor the approach(es) to railroad grade crossings. In operation, the 3000 GCP may function either in the Predictor or Motion Sensor (MS) modes. It detects approaching trains; computes train speed and distance; predicts train arrival time at the crossing; activates crossing-protection equipment at a set (programmed) time prior to the predicted arrival of the train at the crossing threshold of approximately 2 MPH activates crossing-protection equipment at time of train detection.

<sup>2</sup> The HCA is a non-vital, general purpose operational event recorder and analytic diagnostic tool. It features analog inputs, digital inputs/outputs, monitoring, timing, reporting and communication capabilities.

3000 is configured to provide a constant minimum warning time of 30 seconds for approaching trains before they occupy the crossing at any speed up to the maximum allowable speed.

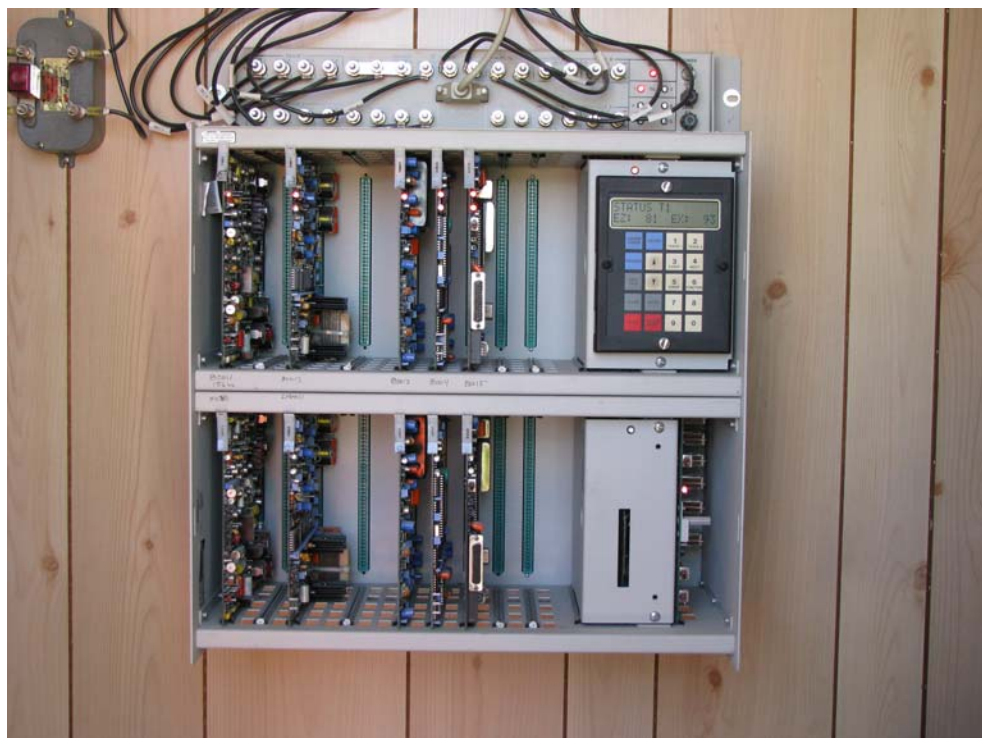
### **Grade Crossing Signal System Event Recorders:**

Due to the extensive damage to the signal bungalow on-site investigators were unable to retrieve any signal data from the GCP-3000 or the HCA unit.

Investigators recovered the GCP 3000 recorder modules (module 80015 card, UP identification number 0113519 and module 80115 card, UP identification number 0113511) and the HCA unit and shipped the equipment to the NTSB Recorder Laboratory for recorder data event recovery efforts.

Due to the extensive damage to the recorder modules no usable data was retrieved.

Exemplar train detection data for a GCP-3000 unit was obtained from the Lovelock Yard grade crossing at MP 343.8 and from a HCA unit from a crossing in Walthway, Nevada at MP 258.27 on the Nevada Subdivision.



**Figure 2. Exemplar GCP-3000 unit.**



**Figure 3. Damaged GCP-3000 unit.**

### **Post Accident Inspection and Testing Of the Grade Crossing Signal System:**

Representatives from the NTSB, UP and the Federal Railroad Administration (FRA) participated in the field inspection of the grade crossing signal system. The post accident inspection found the signal bungalow damaged beyond repair. All grade crossing signal system cases and junction boxes showed no indications of tampering or vandalism that would interfere with the operation of the grade crossing signal system. No exceptions were identified with the design of the grade crossing signal system. Extensive signal damage to the bungalow incurred as a result of the collision.

Once the grade crossing signal system bungalow was replaced and operational, the Signal group worked with NTSB highway investigators examining the visibility of the grade crossing flashers from the highway street. Investigators took photographs at 500 foot increments from the crossing backing up until the flashers were no longer visible. Using an exemplar tractor trailer investigators made digital recordings approaching the crossing at 75 MPH, 70 MPH and 50 MPH. Using a passenger vehicle investigators made digital recordings approaching the crossing at 75 MPH, 70 MPH and 50 MPH. After the first two tests, UP signal personnel cleaned all of the flasher lenses at the crossing. Using an exemplar tractor trailer investigators made digital recordings

approaching the crossing at 70 MPH and 50 MPH. Using a passenger vehicle investigators made digital recordings approaching the crossing at 70 MPH. The grade crossing signal system flashers were visible from 2400 feet.

Investigators recorded the flasher voltage at the Western Cullen Hayes 3593-E gate B junction box. The recorded flasher voltage was 11 volts D.C. The voltage range for 12-inch LED flashers is 8 to 16 volts D.C. The recorded voltage was within the acceptable range of operation.

### **Grade Crossing Signal System Maintenance Records**

UP signal maintenance tests and inspection records were reviewed for the grade crossing signal system. The maintenance records indicate all signal tests and inspections were conducted in accordance with FRA regulations and UP requirements.

Train signal and grade crossing signal system trouble reports for a six-month period were collected. The maintenance records indicate all grade crossing signal tests and inspections were conducted in accordance with UP requirements. The last monthly grade crossing test was on the morning of the accident. The grade crossing signal system was checked for grounds; the system was operated on ac power and stand-by power; lights and signs were inspected and gate heights were noted. Track connections and insulated joints were also inspected. No exceptions were noted that would prevent the grade crossing signal system warning devices from functioning as designed.

The UP trouble tickets were reviewed and no exceptions were noted.

### **Interview**

On the morning of the accident, a UP signal maintainer performed an annual inspection of the grade crossing signal system at US 95, the accident grade crossing. The signal group interviewed the signal maintainer to ascertain what work he performed at the grade crossing. The interview will be transcribed and included in the docket.

### **Signal Damages**

The UP engineering personnel estimated the total grade crossing signal system damages at approximately \$300,000.00. This figure included costs for the total replacement and installation of the demolished grade crossing signal system bungalow.

**END OF REPORT**